REMARKS/ARGUMENTS

In the Office Action mailed January 22, 2010, claims 1 and 3-5 were rejected. Additionally, claim 2 is allowed. In response, Applicants hereby request reconsideration of the application in view of the below-provided remarks. No claims are canceled.

For reference, claims 6-8 are added to depend from independent claim 2 and to recite language similar to the language recited in claims 3-5. These claims are supported by the original language of the claims, as well as the subject matter, for example, described at page 6, lines 26-29, of the specification.

Allowable Subject Matter

Applicants appreciate the Examiner's review of the claims and determination that claim 2 is allowed. Additionally, while the Office Action provides a statement of reasons for the indication of allowable subject matter, the statement is directed to specific aspects of certain claims and not necessarily all of the claims. Applicants note that the comments may have paraphrased the language of the claims and it should be understood that the language of the claims themselves set out the scope of the claims. Thus, it is noted that the claim language should be viewed in light of the exact language of the claim rather than any paraphrasing or implied limitations thereof.

Claim Rejections under 35 U.S.C. 103

Claims 1 and 3-5 were rejected based on one or more cited references. The cited reference(s) relied on in these rejections include:

Hajimiri et al. (U.S. Pat. Pub. No. 2002/0173337, hereinafter Hajimiri)
Cheung (U.S. Pat. No. 6,476,685, hereinafter Cheung)
Chappell (U.S. Pat. Pub. No. 2002/0141494, hereinafter Chappell)
Cullum et al. (U.S. Pat. No. 6,058,258, hereinafter Cullum)
Mathe (U.S. Pat. No. 6,944,219, hereinafter Mathe)

In particular, claims 1 and 3-5 were rejected under 35 U.S.C. 103(a) as being anticipated by Hajimiri, Cheung, Chappell, Cullum, and Mathe. Claims 1 and 3 also were rejected under 35 U.S.C. 103(a) as being unpatentable over Hajimiri, Cheung, Chappell, and Cullum. However, Applicants respectfully submit that these claims are patentable over Hajimiri, Cheung, Chappell, Cullum, and Mathe for the reasons provided below.

Independent Claim 1

Claim 1 is patentable over the combination of Hajimiri, Cheung, Chappell, and Cullum, with or without the additional teachings of Mathe, because the combination of cited references does not teach all of the limitations of the claim. Claim 1 recites:

> A tuning arrangement for receiving a plurality of signal channels and for tuning to a specific of said plurality of signal channels, the arrangement comprising:
>
> a polyphase mixer for mixing said specific signal channel to an intermediate frequency which is lower than twice the bandwidth of the channel;
>
> a polyphase IF filter for rejecting the negative frequencies in the mixer output signal; and
>
> a polyphase group delay equalizer connected to the output of the polyphase IF filter;
>
> wherein the transfer function of the polyphase group delay equalizer has, for the frequency range of interest, one or more pole-zero pairs alongside of only the positive imaginary axis of the complex frequency plane with the pole(s) and the zero(s) of said one or more pairs lying substantially symmetrically with respect to said positive imaginary axis, wherein the one or more pole-zero pairs are shifted along the positive imaginary axis off of the real axis of the complex frequency plane.

(Emphasis added.)

As a preliminary matter, it should be noted that Applicants' previous remarks presented in response to the previous Office Action address the deficiencies of the combination of Hajimiri, Cheung, Chappell, and Cullum. For convenience, those arguments are presented again within this response.

The same or similar arguments also apply to the proposed combination of Hajimiri, Cheung, Chappell, Cullum, and Mathe. Additionally, the claims of the present

application are patentable over the combination of Hajimiri, Cheung, Chappell, Cullum, and Mathe because Mathe does not remedy the lack of teaching or the impropriety of the proposed combination of Hajimiri, Cheung, Chappell, and Cullum.

1. Independent Claim 1 is patentable over the combination of Hajimiri, Cheung, Chappell, and Cullum.

The combination of Hajimiri, Cheung, Chappell, and Cullum does not teach all of the limitations of the claim. In particular, the combination of Hajimiri, Cheung, Chappell, and Cullum does not teach a polyphase group delay equalizer with a transfer function with one or more pole-zero pairs alongside of only the positive axis, and shifted along the positive imaginary axis off of the real axis, as recited in the claim.

For reference, the reasoning in the Office Action acknowledges that Hajimiri does not teach the indicated limitation, and the Office Action does not rely on Chappell as addressing the indicated limitation. Hence, the reasoning in the Office Action relies on Cheung as purportedly teaching a transfer function with one or more pole-zero pairs alongside of only the positive imaginary axis of a complex frequency plane. Office Action, 7/21/09, page 4; Office Action 1/22/10, page 6. The reasoning in the Office Action also relies on Cullum as purportedly teaching one or more pole zero pairs alongside of only the positive imaginary axis and shifted along the positive imaginary axis off of the real axis of the complex frequency plane. Office Action, 7/21/09, page 5; Office Action 1/22/10, pages 6-7.

However, the assertions in the Office Action regarding the purported teachings of Cheung and Cullum are inaccurate because Cheung does not teach pole-zero pairs alongside of only the positive imaginary axis and Cullum does not teach pole-zero pairs alongside of only the positive imaginary axis. Additionally, the proposed combination of references is improper at least because the referenced teachings of Cheung and Cullum are inconsistent and, hence, should not be combined. Consequently, the assertions in the Office Action are insufficient to establish a *prima facie* rejection.

a. The rejection is improper because Cheung and Cullum do not teach the asserted limitations.

As stated above, the Office Action asserts that Fig. 4a of Cheung purportedly teaches pole-zero pairs alongside of only the positive imaginary axis. However, Fig. 4a of Cheung merely teaches a pole-zero pair along the real axis, which is not located at either the positive or negative imaginary axis. Rather, the real axis is located at the zero point of the imaginary axis and, thus, is in between the positive and negative portions of the imaginary axis. Having a pole-zero pair at the real axis between the positive and negative portions of the imaginary axis should not be interpreted as being alongside of the positive imaginary axis because the real axis is not at the positive portion of the imaginary axis. In fact, the real axis is no closer to the positive portion of the imaginary axis than it is to the negative portion of the real axis. If it were considered acceptable to designate the real axis as being alongside of the positive imaginary axis, then it would also have to be acceptable to designate the real axis as being alongside of the negative imaginary axis. However, since the real axis cannot be adjacent to or alongside of both the positive and negative imaginary axes, the real axis should not be construed as being alongside of either the positive or the negative imaginary axes. Therefore, the teaching of a pole-zero pair along the real axis of Cheung should not be construed as a pole-zero pair alongside of the positive imaginary axis, at least because the real axis is not alongside of the positive imaginary axis. Accordingly, Cheung does not teach the limitations of one or more pole-zero pairs alongside of only the positive imaginary axis of the complex frequency plane.

Similarly, Cullum does not teach the limitations referenced in the Office Action. As stated above, the Office Action asserts that Cullum purportedly teaches one or more pole zero pairs alongside of only the positive imaginary axis and shifted along the positive imaginary axis off of the real axis of the complex frequency plane. For reference, Cullum is generally directed to a system for creating linear circuit models for analyzing the stability and passivity of different physical systems. Cullum, col. 1, lines 6-10. In the embodiments referenced in the Office Action, Cullum describes using only the behavior of pole-zero pairs that are in a region in the upper half of the complex plane. Cullum, col. 10, lines 28-32. Presumably, the reference to the upper half of the complex

plane is interpreted in the Office Action as the positive imaginary axis. Even if some of the models used in Cullum only consider the behavior of pole-zero pairs alongside the positive imaginary axis, Cullum nevertheless recognizes that the pole-zero pairs of the actual physical systems that are being modeled must occur in conjugate pairs. In other words, in the actual physical systems that are being modeled in Cullum, the pole-zero pairs alongside the positive imaginary axis must have conjugate pole-zero pairs alongside the negative imaginary axis. The fact that the models used in Cullum might ignore the behavior of the pole-zero pairs alongside the negative imaginary axis does not negate the fact that such pole-zero pairs alongside the negative imaginary axis must exist in the actual physical systems that are being modeled. Therefore, the teachings of using a model based on the behavior of pole-zero pairs alongside only the positive imaginary axis is insufficient to teach actual physical systems with pole-zero pairs alongside only the positive imaginary axis. Accordingly, Cullum does not teach the limitations of one or more pole-zero pairs alongside of only the positive imaginary axis of the complex frequency plane in an actual physical system such as a polyphase group delay equalizer.

b. The Office Action does not establish a *prima facie* case of obviousness because the reasoning in the Office Action relies on inconsistent teachings.

Moreover, even if the combination of cited references were to teach all of the limitations of the claim, the rejection of claim 1 nevertheless is improper because the Office Action does not establish a *prima facie* rejection for the claim. In order to establish a *prima facie* rejection of a claim under 35 U.S.C. 103, the Office Action must present a clear articulation of the reason why the claimed invention would have been obvious. MPEP 2142 (citing *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007)). The analysis must be made explicit. Id. Additionally, rejections based on obviousness cannot be sustained by mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. Id.

In the rejection of claim 1, the reasoning in the Office Action attempts to combine the teachings of Fig. 4a of Cheung with the description in Cullum. As explained above,

Fig. 4a of Cheung illustrates a pole-zero pair that is located directly on the real axis, so the pole-zero pair is not shifted in the positive direction of the imaginary axis. In other words, the pole-zero pair of Fig. 4a is not alongside the imaginary axis. In contrast, the referenced teachings of Cullum relate to implementing a model using only the behavior of pole-zero pairs in the positive half of the imaginary plane, even though Cullum indicates that the modeled physical systems must occur in conjugate pairs.

Even if it were possible to otherwise combine the teachings of Cheung and Cullum, the locations of the pole-zero pairs in Cheung and Cullum are different and not suitable for combination with each other. Specifically, combining the pole-zero pair on the real axis of Cheung with the modeling system of Cullum would result in a model without any behavior in the region in the upper half of the complex plane, because Fig. 4a of Cheung does not include any pole-zero pairs in the upper half of the complex plane. Conversely, combining pole-zero pairs in the upper half of the complex plane, as described in Cullum, with the pole-zero pair on the real axis of Cheung would result in pole-zero pairs located both in the upper half of the complex plane as well as on the real axis. Hence, the resulting combination of pole-zero pairs would not be located only alongside the positive axis. Moreover, Cullum recognizes that the pole-zero pairs in the upper half of the complex plan must have conjugate pairs in the lower half of the complex plane, so the proposed combination of Cheung and Cullum would further result in pole-zero pairs in the lower half of the complex plane. Consequently, the presence of pole-zero pairs in the lower half of the complex plane would not qualify as having pole-zero pairs alongside only the positive imaginary axis. Therefore, the inconsistent teachings of pole-zero pairs on the real axis and in the upper half (and corresponding lower half) of the complex plane cannot be combined, despite the assertions in the Office Action, to achieve a transfer function of a polyphase group delay equalizer which as has one or more pole-zero pairs alongside of only the positive imaginary axis of the complex frequency plane.

For the reasons presented above, the attempt to combine the inconsistent teachings of Cheung and Cullum is improper because the combination of pole-zero pairs on the real axis and in the upper and lower halves of the complex plane does not address the actual limitations of the claim, namely one or more pole-zero pairs alongside of only

the positive imaginary axis of the complex frequency plane. Since the reasoning in the Office Action relies on inconsistent teachings, the reasoning asserted in the Office Action is improper and, hence, fails to support a *prima facie* rejection for claim 1. Accordingly, Applicants respectfully submit that the rejection of claim 1 under 35 U.S.C. 103(a) should be withdrawn because the Office Action fails to establish a *prima facie* rejection.

2. Independent Claim 1 is patentable over the combination of Hajimiri, Cheung, Chappell, Cullum, and Mathe.

The combination of Hajimiri, Cheung, Chappell, Cullum, and Mathe also fails to teach all of the limitations of the claim. In particular, the combination of Hajimiri, Cheung, Chappell, Cullum, and Mathe does not teach a polyphase group delay equalizer with a transfer function with one or more pole-zero pairs alongside of only the positive axis, and shifted along the positive imaginary axis off of the real axis, as recited in the claim.

For reference, the reasoning presented in support of this ground of rejection is substantially similar to the other ground of rejection discussed above. However, the reasoning in the Office Action also relies on Mathe as purportedly teaching poles and zeros lying along only a positive imaginary axis. This characterization of Mathe is insufficient to remedy the lack of teachings by the combination of Hajimiri, Cheung, Chappell, and Cullum for at least three reasons.

First, Mathe does not teach pole-zero pairs along only the positive imaginary axis. Rather, Fig. 5 of Mathe explicitly shows two zeros located on the real axis 136. Mathe explains that the two zeros 142 on the real axis 136 help to further compensate for passband droop and originate from the finite impulse response (FIR) equalization filter 20. Mathe, col. 9, lines 23-25. Thus, Mathe should not be characterized as teaching poles and zeros lying along only the positive imaginary axis, as asserted in the Office Action, because Mathe explicitly shows and describes zeros on the real axis.

Second, even if the zeros on the real axis were ignored, for the sake of argument, Mathe does not state that the poles and zeros are only located along the positive imaginary axis. Rather, Mathe explicitly states that the pole-zero plot 130 shown in Fig. 5 depicts only the upper half of a unit circle 132. Mathe, col. 9, lines 13-15. In other

words, the lower half of the pole-zero plot 130—corresponding to the negative imaginary axis—is merely omitted from the plot. But the omission of the negative imaginary axis from the plot of Fig. 5 does not mean that there are not poles and/or zeros located along the negative imaginary axis; it merely indicates that the lower half of the plot is not shown. In other words, there is no indication whether or not the lower half of the unit circle might include poles and/or zeros along the negative imaginary axis. Thus, the depiction of only the top half of the plot is insufficient to teach that corresponding poles and/or zeros are not included in the lower other half of the plat. The mere absence in Mathe of a complete explanation of the poles and zeros within the unit circle should not be construed as an absolute teaching that such poles and zeros do not exist.

Third, Mathe also explains that the pole-zero plot 130 of Fig. 5 is for the transfer function of the programmable digital filter, as a whole. The pole-zero plot is not for a polyphase group delay equalizer. Moreover, the zeros 138 located on the negative half of the real axis (i.e., to the left of the positive imaginary axis) are not related to an equalizer or an equalization transfer function. Rather, the indicated zeros 138 originate from the jammer filters 30, 34, and 38. Thus, even though the infinite impulse response (IIR) filter 18 contributes the poles to the right of the positive imaginary axis, Mathe does not describe any transfer functions for equalizers and, more specifically, for a polyphase group delay equalizer with pole-zero pairs along only the positive axis.

For the reasons presented above, the combination of Hajimiri, Cheung, Chappell, Cullum, and Mathe also fails to teach all of the limitations of the claim, and additionally is an improper combination. Accordingly, Applicants submit that the rejections based on the combination of Hajimiri, Cheung, Chappell, Cullum, and Mathe should be withdrawn.

Independent Claim 3

Applicants respectfully assert independent claim 3 is patentable over the proposed combinations of cited references at least for similar reasons to those stated above in regard to the rejection of independent claim 1. Claim 3 recites subject matter which is similar to the subject matter of claim 1 discussed above. Although the language of this claim differs from the language of claim 1, and the scope of each claim should be

interpreted independently of other claims, Applicants respectfully asserts that the remarks provided above in regard to the rejection of claim 1 also apply to the rejection of claim 3.

Dependent Claims

Claims 4-8 depend from and incorporate all of the limitations of the corresponding independent claims 2 and 3. Applicants respectfully assert claims 4-8 are allowable based on allowable base claims. Additionally, each of claims 4-8 may be allowable for further reasons.

CONCLUSION

Applicants respectfully request reconsideration of the claims in view of the amendments and the remarks made herein. A notice of allowance is earnestly solicited.

At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account **50-4019** pursuant to 37 C.F.R. 1.25. Additionally, please charge any fees to Deposit Account **50-4019** under 37 C.F.R. 1.16, 1.17, 1.19, 1.20 and 1.21.

Respectfully submitted,

/mark a. wilson/

Date: April 22, 2010

Mark A. Wilson
Reg. No. 43,994

Wilson & Ham
1811 Santa Rita Road, Suite 130
Pleasanton, California 94566
Phone: (925) 249-1300
Fax: (925) 249-0111